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Analysis of the sheath model for radio frequency magnetron discharges DENNIS ENGEL, LAURA KROLL, DENNIS KRUEGER, RALF PETER BRINKMANN, Ruhr University Bochum, Germany — Based on a global capacitive radio frequency discharge model [1], a new model for magnetron discharges has been proposed. In this model, the magnetized region is represented by a resistance, taking into account Bohm-diffusion [2].
Due to an asymmetric electrode configuration ($A_{grounded} >> A_{powered}$) different models for the sheath at the electrodes are implemented. The grounded electrode is represented by a DC-floating-potential and for the powered electrode the dynamic behavior of the sheath is regarded. The effects of this assumption to the new, magnetized model are discussed.
In the second part of this work, the sheath model itself is considered. It is assumed to be a matrix sheath. Although being a quite simple model, qualitatively good results can be obtained in comparison to experiments. Within the model the ion density is considered to be constant inside the whole sheath region, which is obviously a crude assumption. To improve this, new ion density profiles are implemented. The new voltage-charge ($V(Q)$)-characteristic is determined and the effects on the nonlinear resonance behavior are studied.

[1] T. Mussenbrock et al., PSST **16**, 377385 (2007)
[2] D. Bohm, The characteristics of electrical discharges in magnetic fields (1949)

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